Continuity Along Stream Corridors

Making Natural Connections

Problem Statement:

"Balancing the needs of community development, economic growth, and transportation systems with equally important environmental and outdoor recreation needs can pose important challenges in stream corridors; fragmentation, or disconnections in the stream environment and associated habitat, degrades quality of life for both people and watershed systems."

Southeastern Wisconsin Regional Planning Commission

Our purpose in this document is to highlight some concepts to address issues associated with stream crossings and their affects on water quality, water movement, fisheries passage, flooding, and riverside communities.

Preparation of this publication was funded in part by the U.S. Environmental Protection Agency, Great Lakes National Program Office, Lake Michigan Watershed Academy.

State of Lake Michigan Conference Presentation

September 28, 2011

Gary Korb

UW-Extension and Southeastern Wisconsin Regional Planning Commission

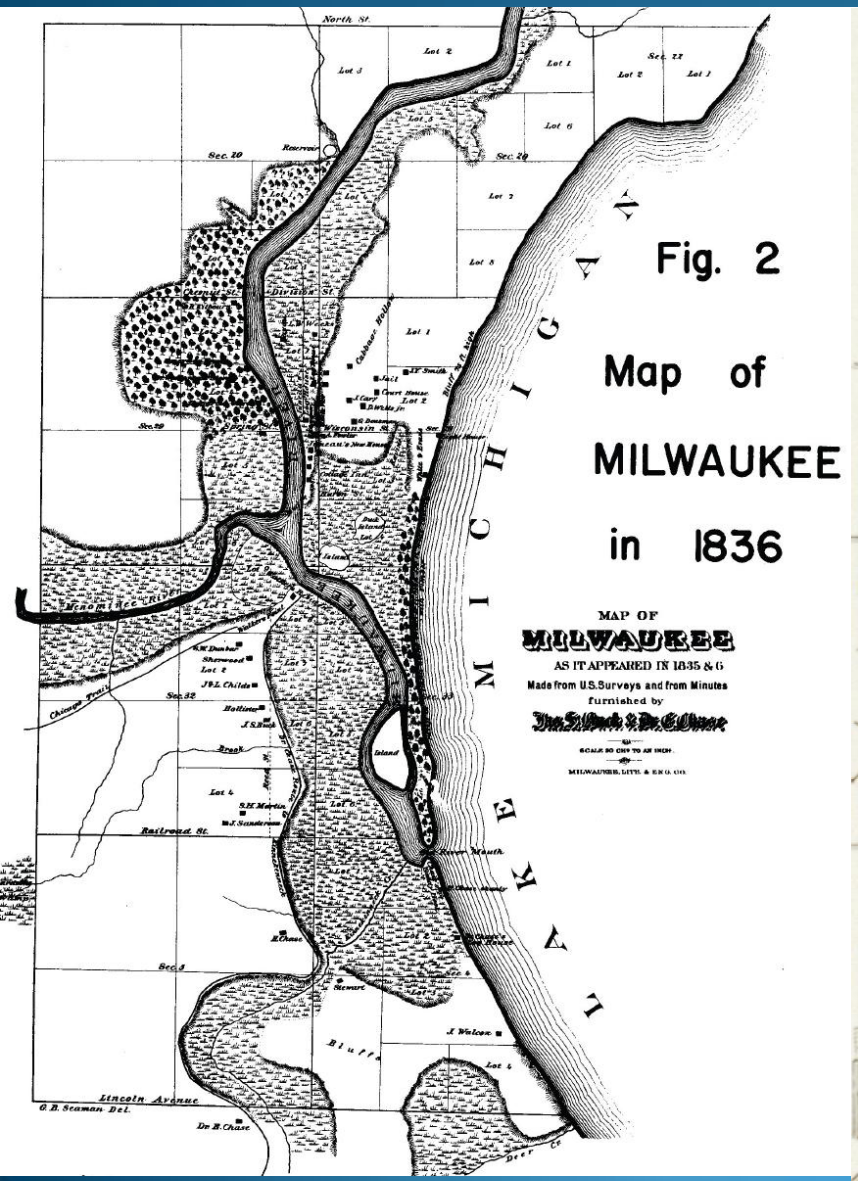
Well Connected Stream and its Floodplain During High Water: 180 degree sweep

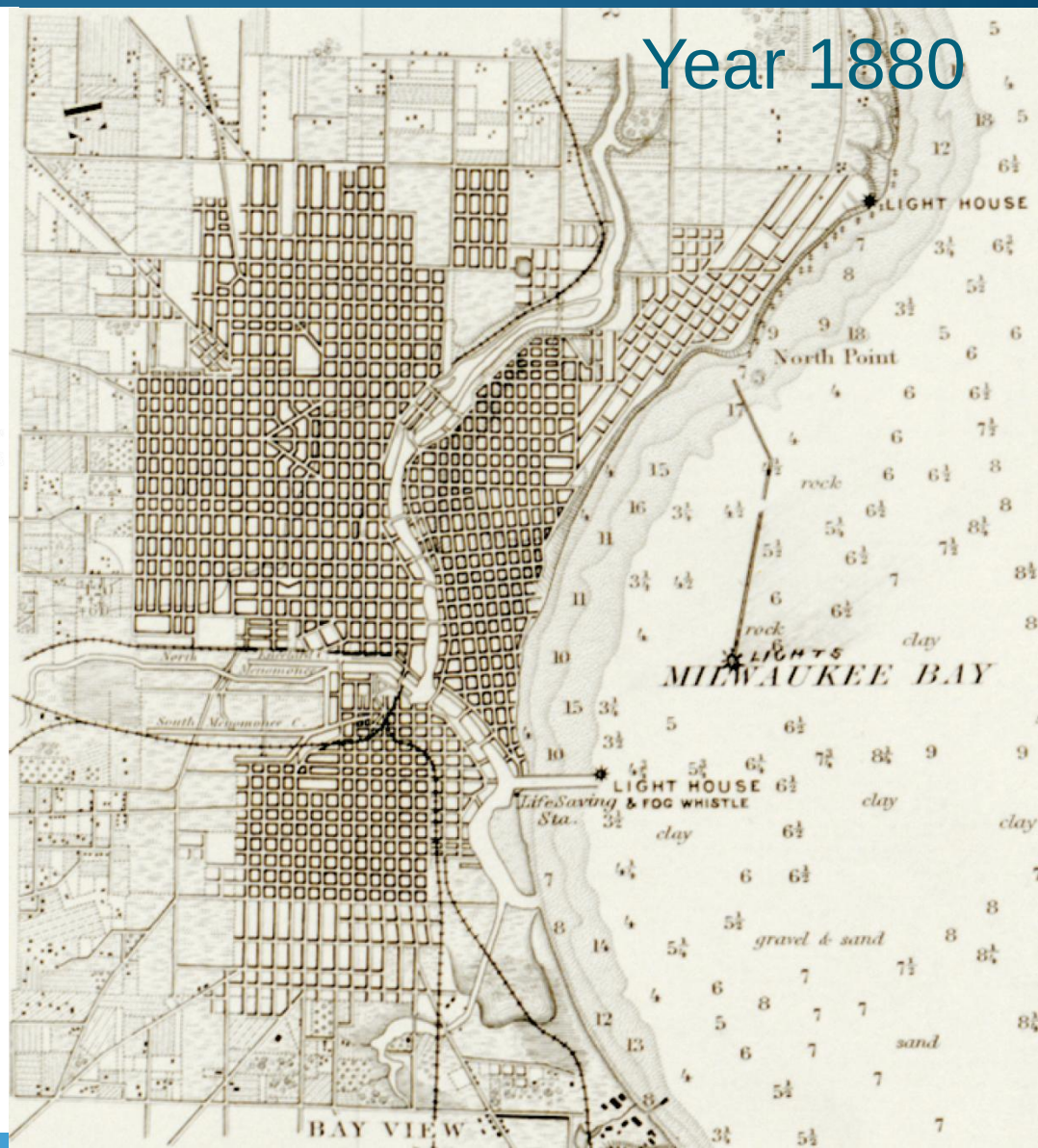
Looking South

Looking North

Environmental Corridors, Stream/Habitat Continuity, Buffer Enhancements, and Adoption Challenges…

Early Environmental Corridor and Watershed Manipulation…

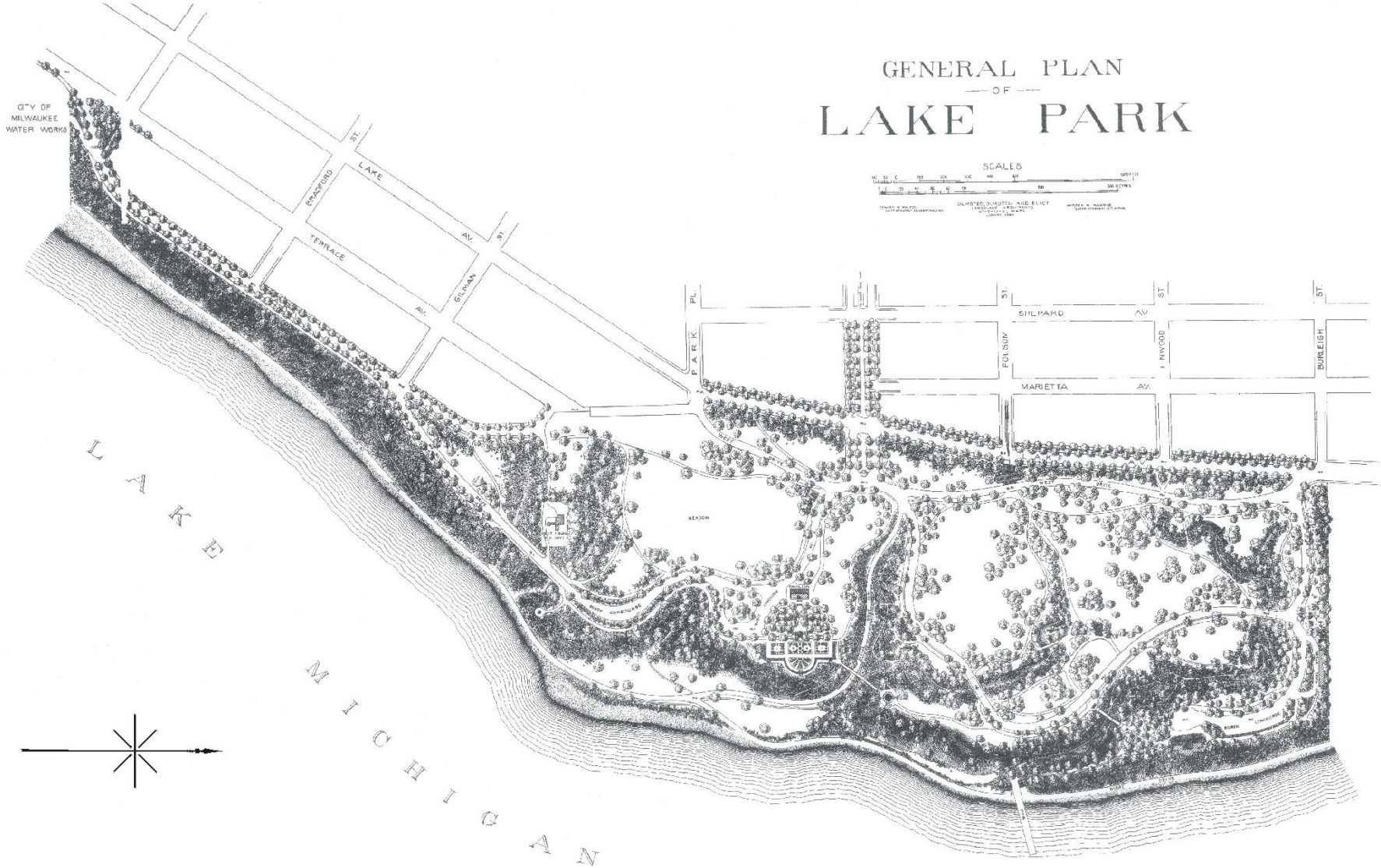




Milwaukee Harbor/Lakeshore: Lake Park 1923

Source: Milwaukee County Department of Parks, Recreation, and Culture.

Original Design Plan of Lake Park: Frederick Olmstead, 1895



Source: Milwaukee County Department of Parks, Recreation, and Culture.

Historic Bluff Characteristics: Lake Shore Drive

July 17, 1929

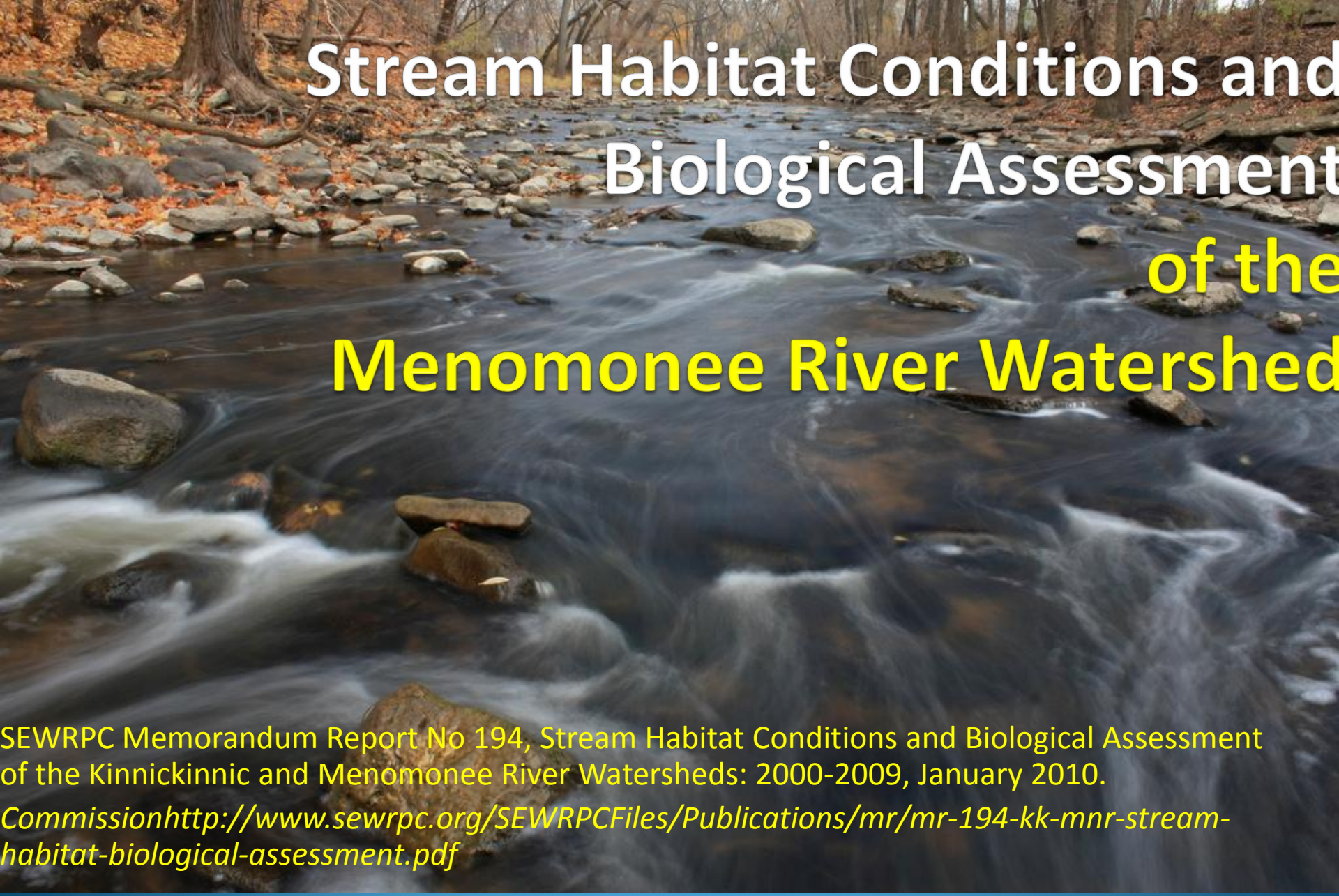
February 11, 2003

Bluff Vegetation Community

Frederick Law Olmstead's Planting List: 1891

- 188,000 trees and shrubs (86 total species) distributed among nine different sections of the park
  - 78% or 67 out of the 86 species are considered non-native species to this Midwestern Regional climate
  - 100,000 in total primarily came from French nurseries
  - Only about 5-20% of the original 86 species currently exist within the Park
    - Black Locust
    - European Buckthorn

Source: SEWRPC



Stream Habitat Conditions and Biological Assessment of the Menomonee River Watershed

SEWRPC Memorandum Report No 194, Stream Habitat Conditions and Biological Assessment of the Kinnickinnic and Menomonee River Watersheds: 2000-2009, January 2010.

Commissionhttp://www.sewrpc.org/SEWRPCFiles/Publications/mr/mr-194-kk-mnr-stream-habitat-biological-assessment.pdf

Photo: Alan Cressler, USGS

Average and high flow magnitude, high flow frequency, and high flow duration have been associated with changes in aquatic communities.

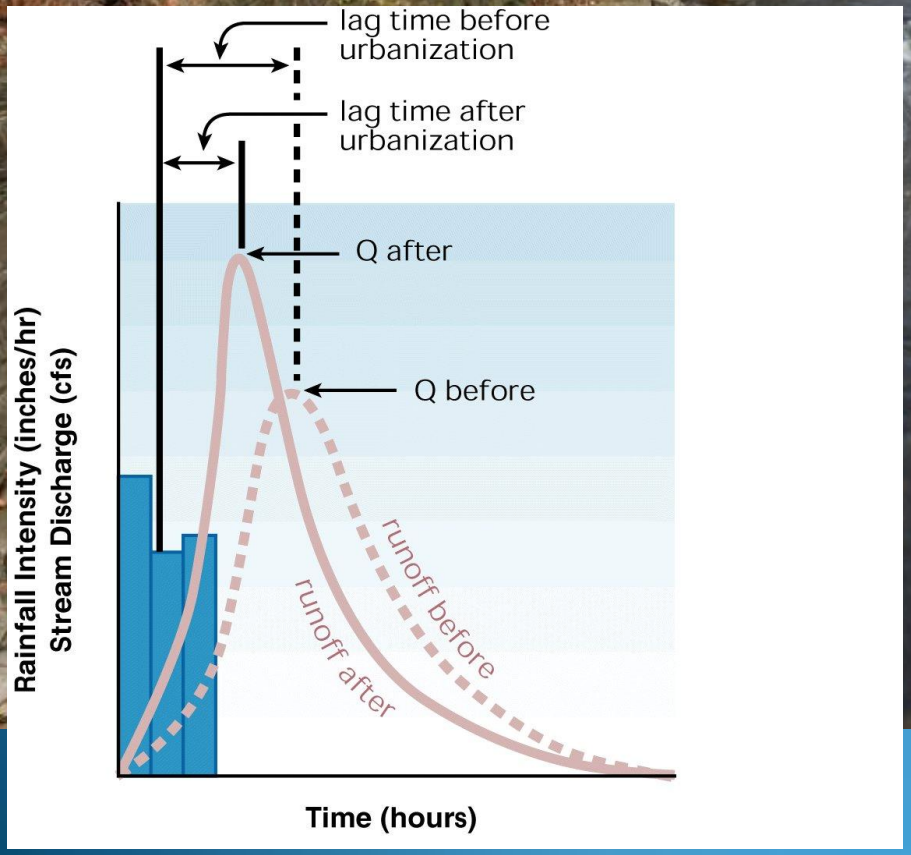
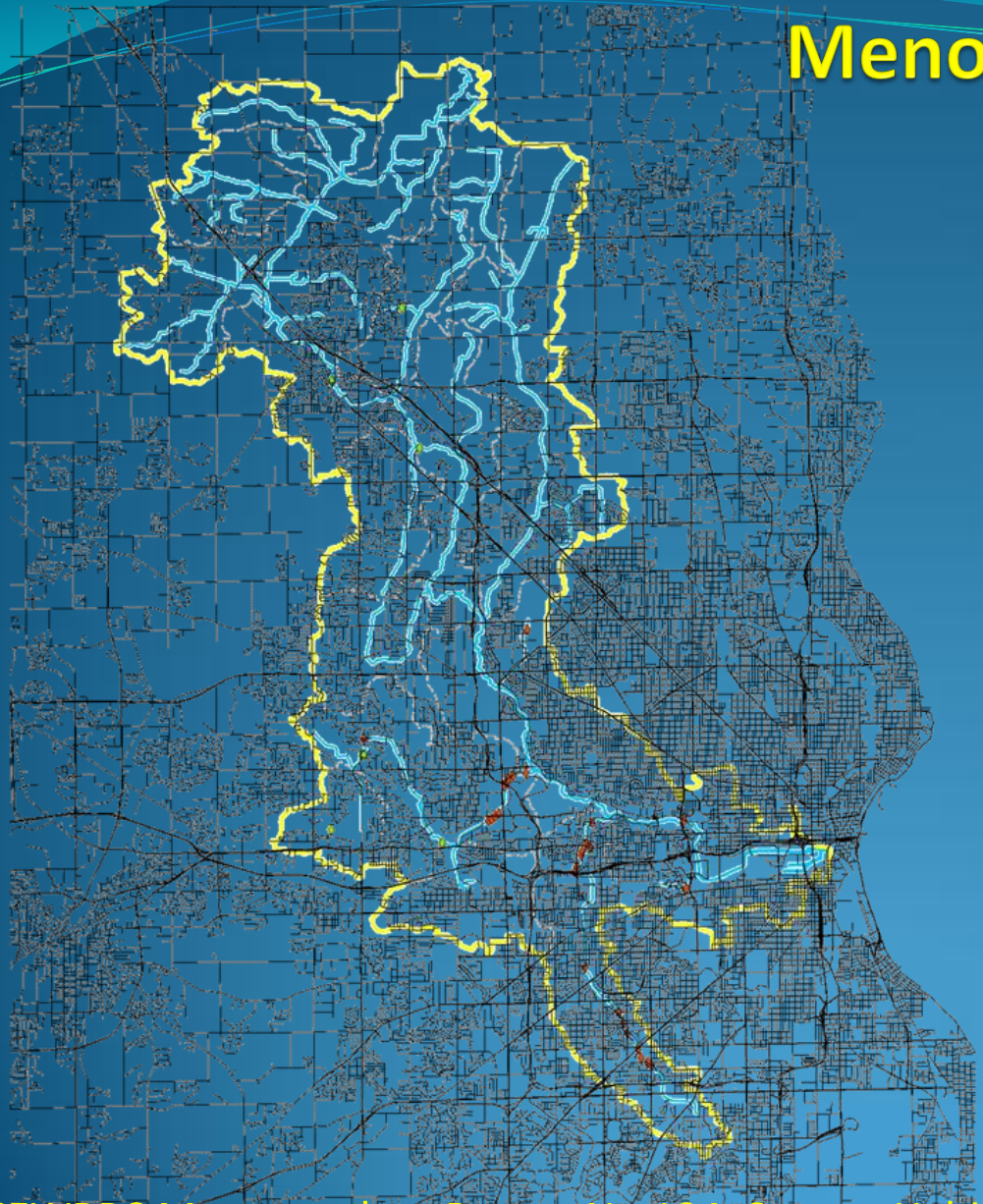


Photo: Alan Cressler, USGS

Stream Habitat Conditions and Biological Assessment

Menomonee River Watershed



36 -Dams & Drop Structures

269 -Road/railway crossings, culverts

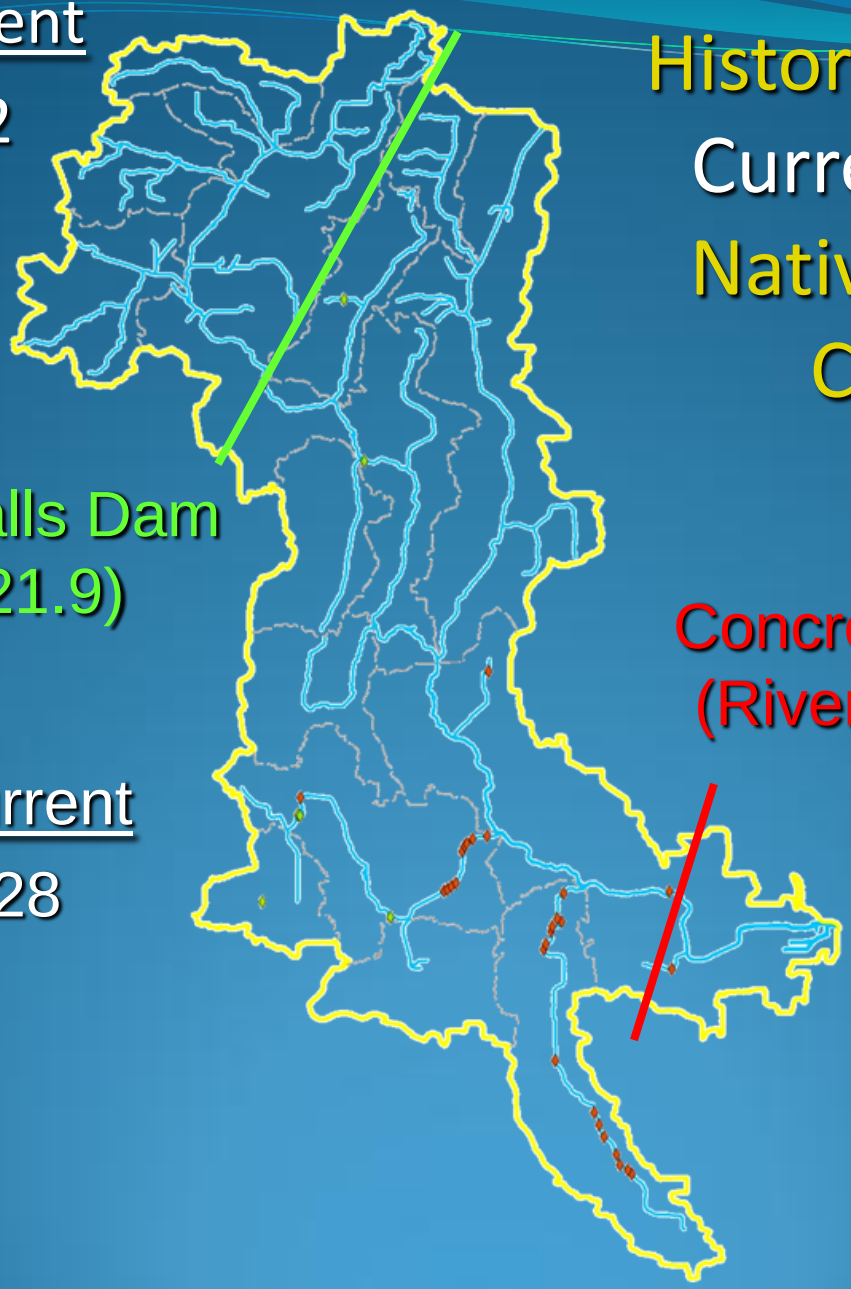
SEWRPC Memorandum Report No 194, Stream Habitat Conditions and Biological Assessment of the Kinnickinnic and Menomonee River Watersheds: 2000-2009, January 2010.

Historic 1902-1999 vs Current 2000-2009 Native Fish Species Comparison

Historic	Current
23	22

Menomonee Falls Dam
(River Mile 21.9)

Historic	Current
33	28

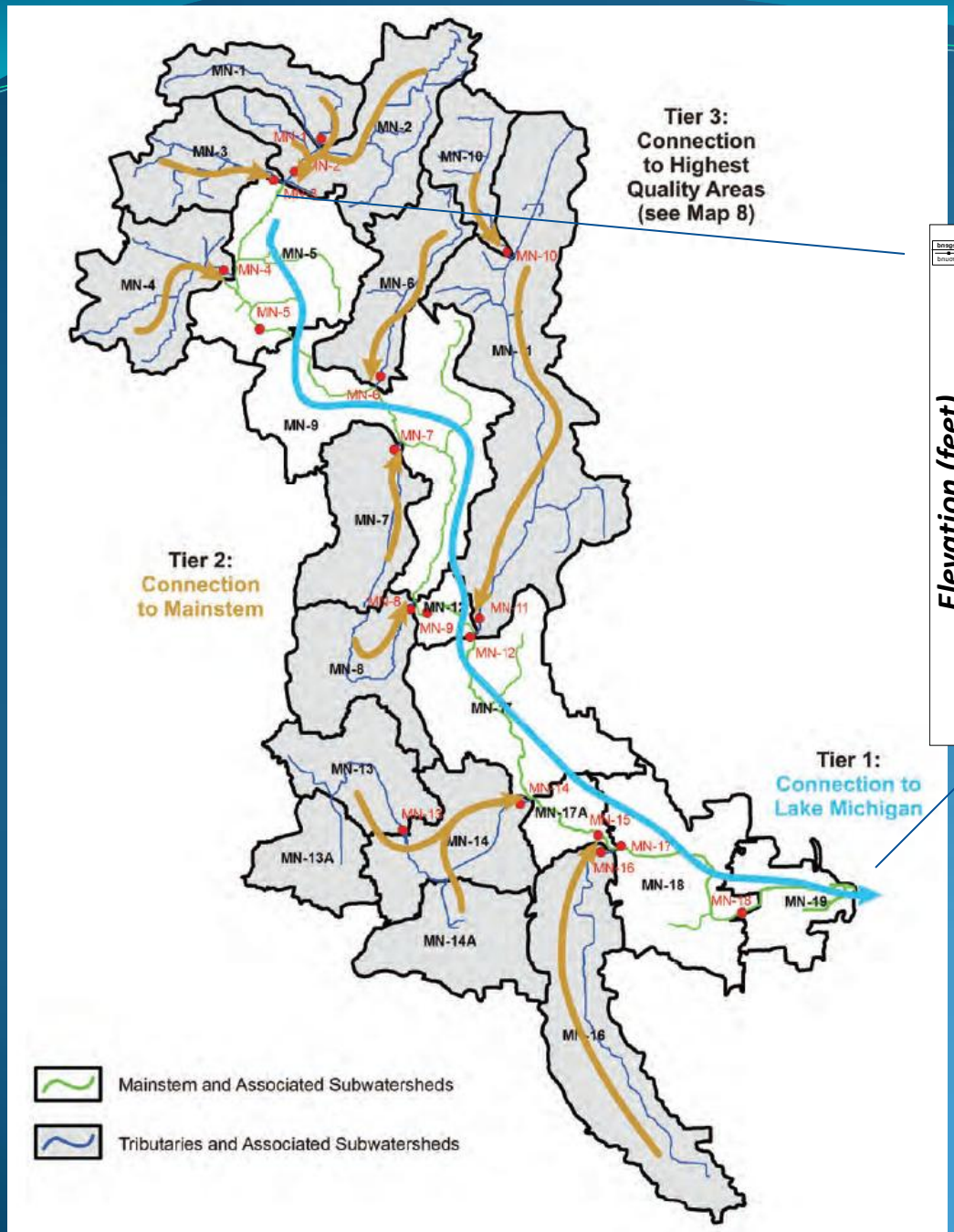


Concrete Lined Channel
(River Miles 3.62-4.24)

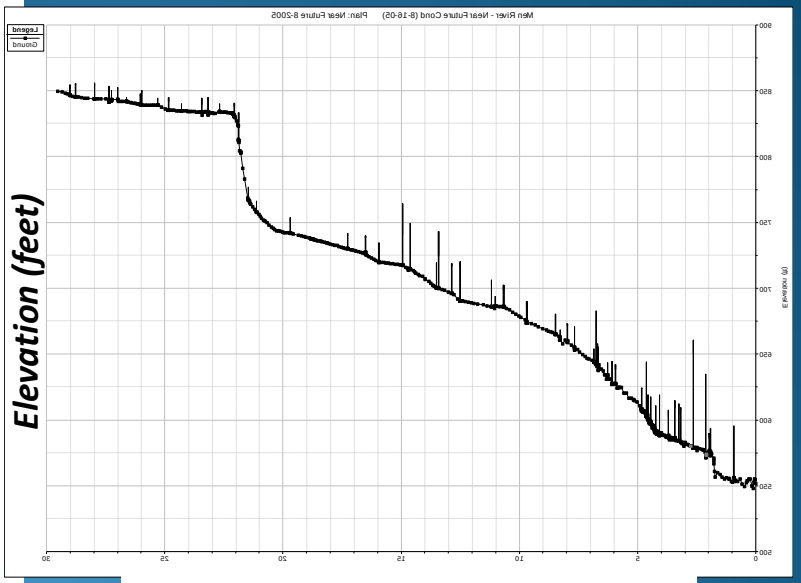
Historic	Current
11	38

Fish Passage Strategy

Instream Three-Tier Prioritization Strategy

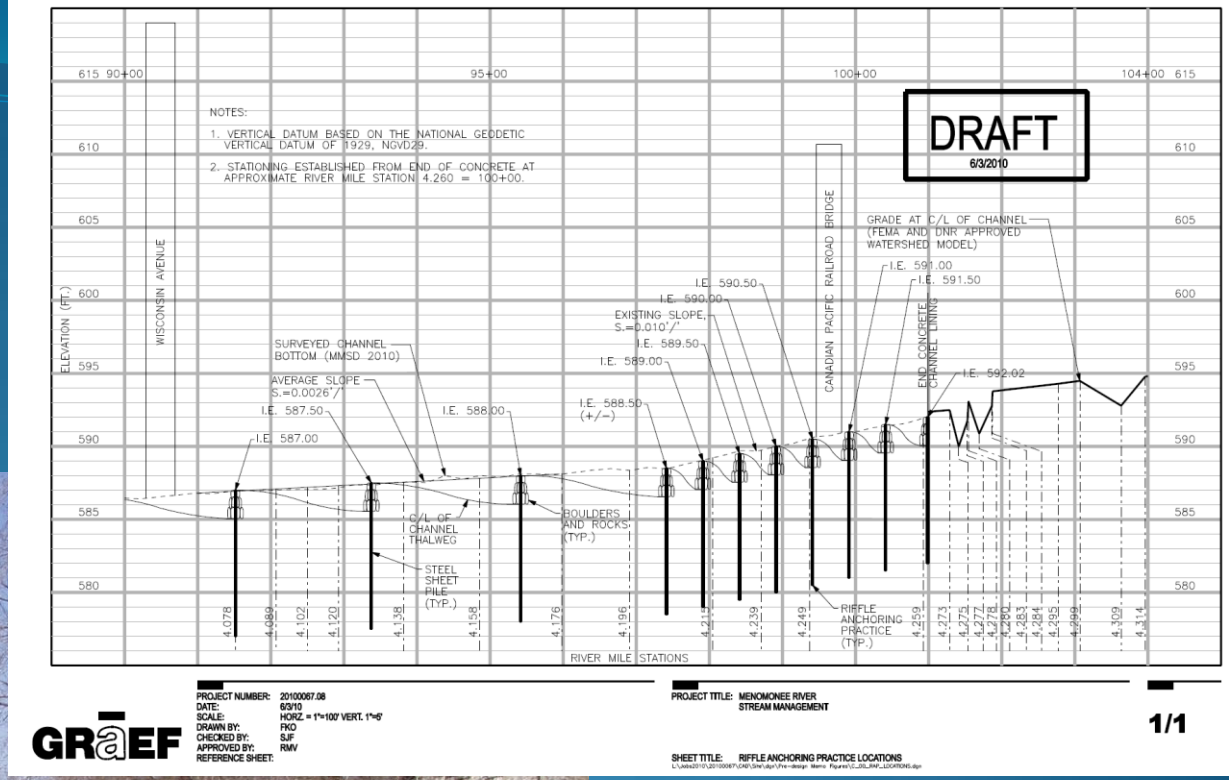


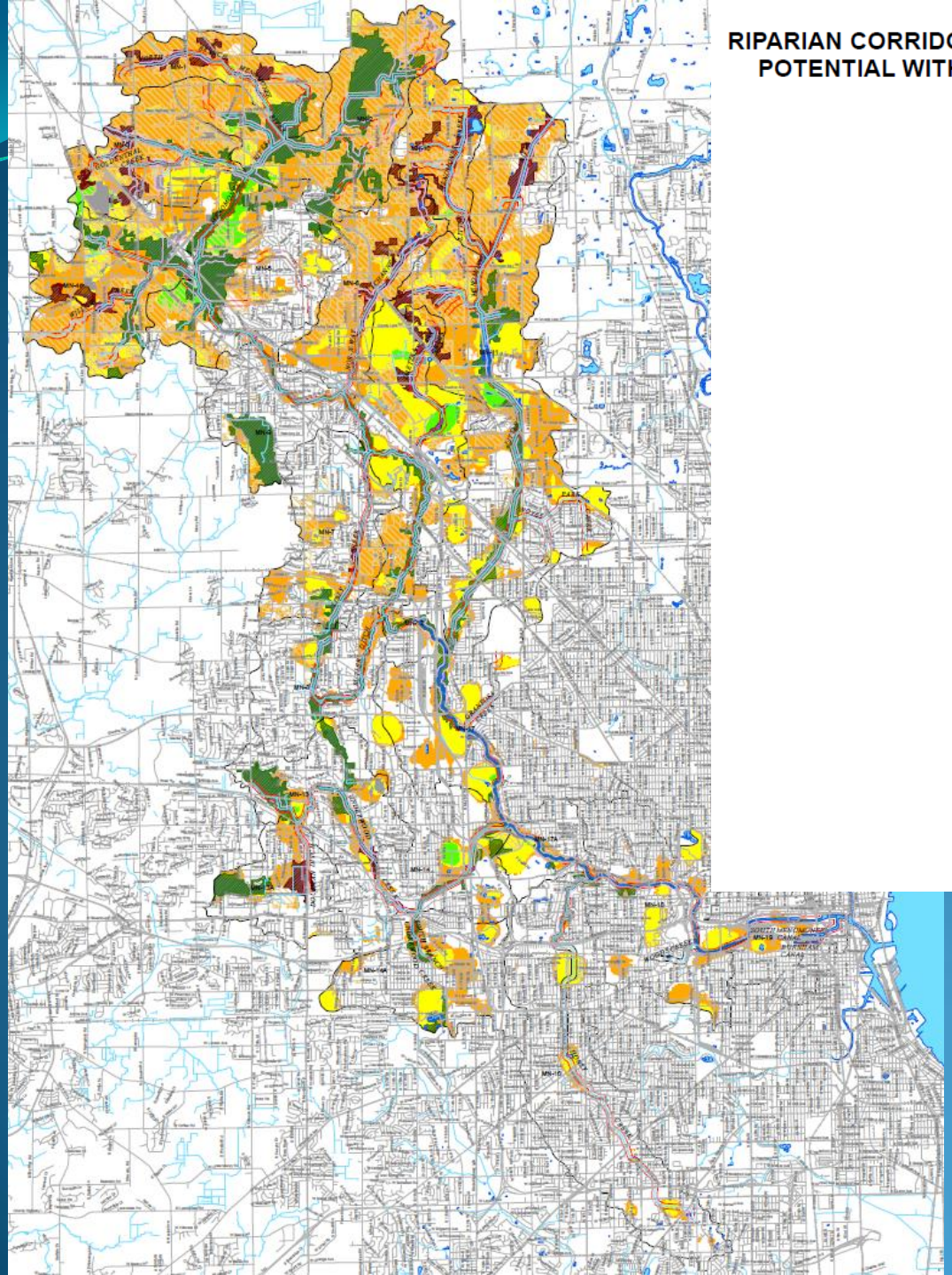
Menomonee River Mainstem Streambed Elevation Profile and Roadway Crossings



Conclusion:

We have opportunities and continued challenges!





RIPARIAN CORRIDOR CONDITIONS AND GROUNDWATER RECHARGE POTENTIAL WITHIN THE MENOMONEE RIVER WATERSHED: 2009

Riparian Corridor Buffer Widths

- Greater than or equal to 75 Feet
- Less than 75 Feet
- Enclosed Channel

- Primary Environmental Corridor
- Secondary Environmental Corridor

- Agricultural Land

Groundwater Recharge Potential

- Low
- Moderate
- High
- Very High
- Undefined (Generally discharge areas)

NOTE: Groundwater recharge areas are generally delineated based on regional-scale data. Project design will require additional on-site assessments.

Land Based Strategy

Managing the Water's Edge

Making Natural Connections

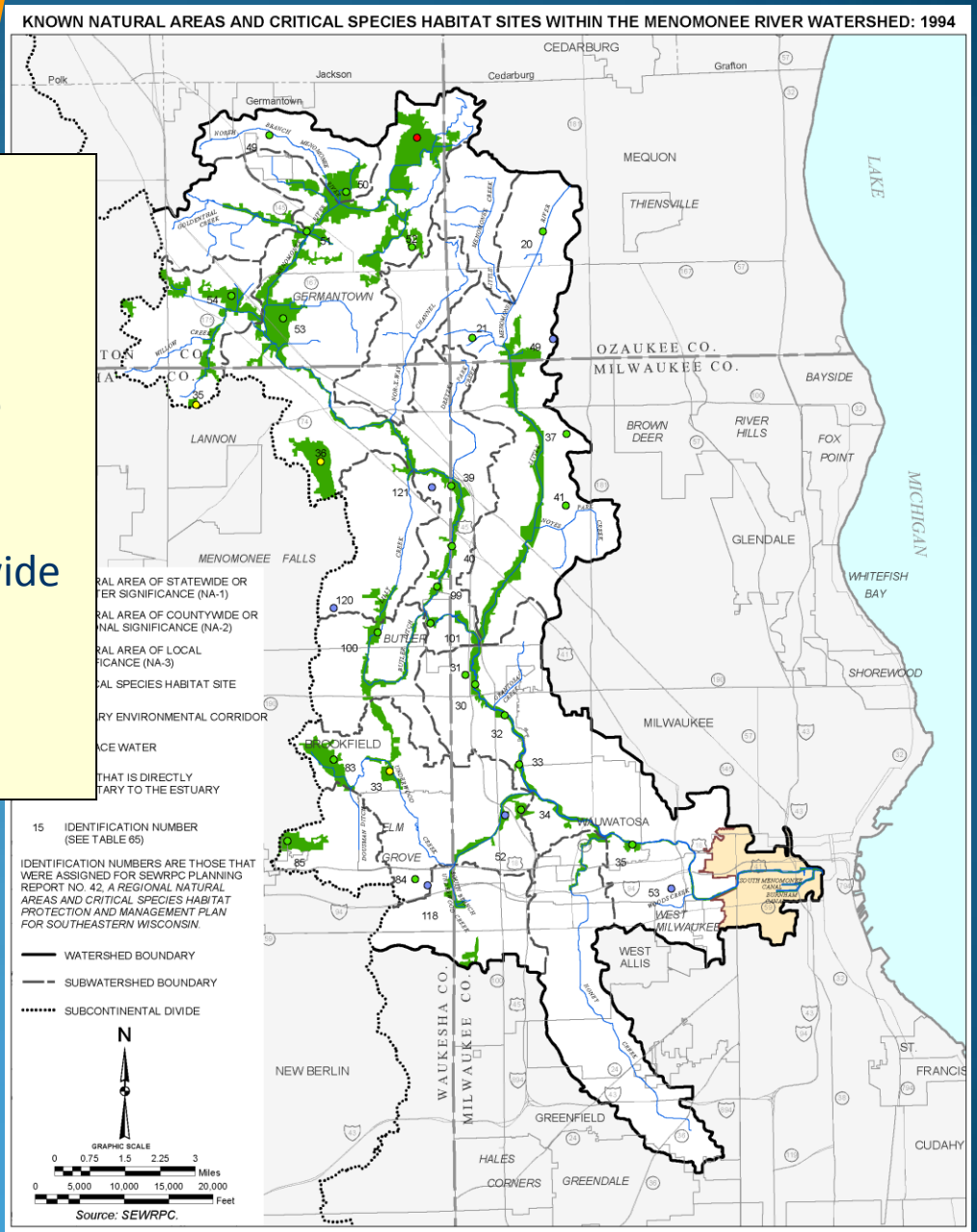
Thomas Slawski, Principal Planner

Southeastern Wisconsin Regional Planning Commission

http://www.sewrpc.org/SEWRPCFiles/Environment/RecentPublications/ManagingtheWatersEdge-brochure.pdf

Environmental Corridor Protection has been an effective tool

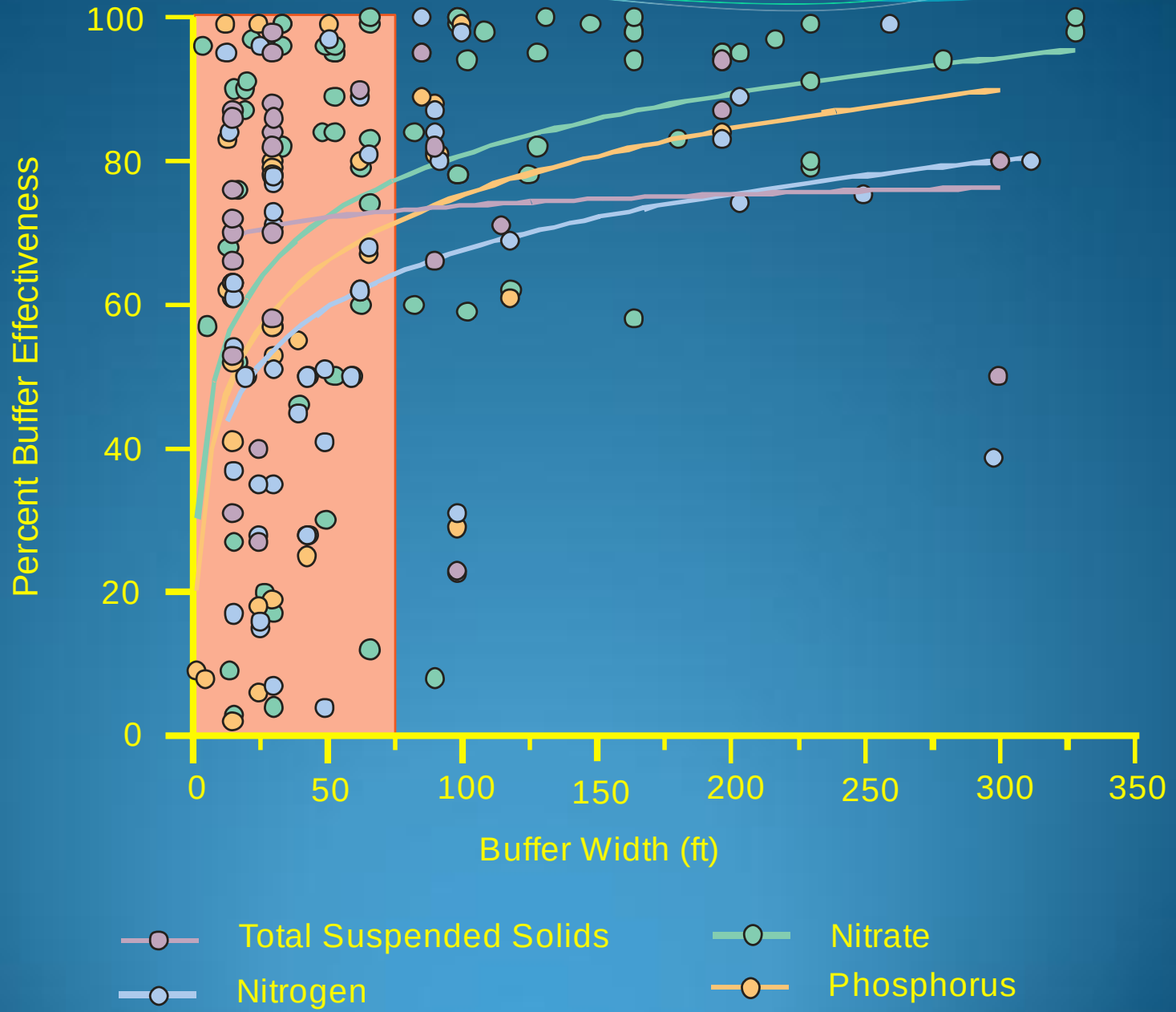
- **Primary environmental corridors:** 200 feet wide, 2 miles long, and 400 acres
- **Secondary environmental corridors:** 1 mile long and 100 acres (no minimum width)
- **Isolated natural resource areas:** 200 feet wide and 5 acres



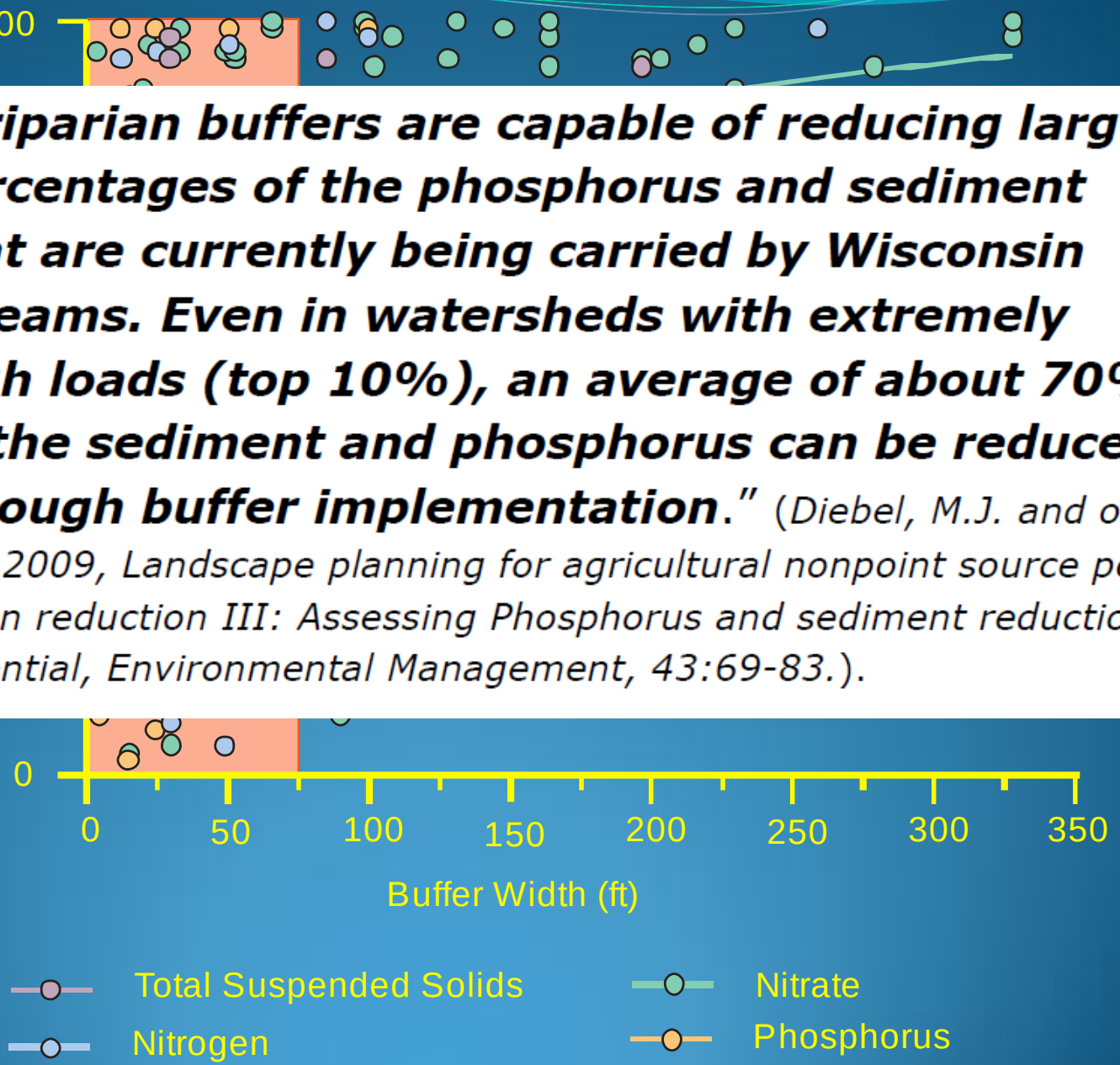
SEWRPC Technical Record Vol. 4, No. 2
Refining the Delineation of Environmental Corridors in Southeastern Wisconsin, March 1981


Problems can exist with compromises to Environmental Corridors, highlighting the need for Riparian Buffers in rural as well as urban areas

RIPARIAN BUFFER EFFECTIVENESS ANALYSIS



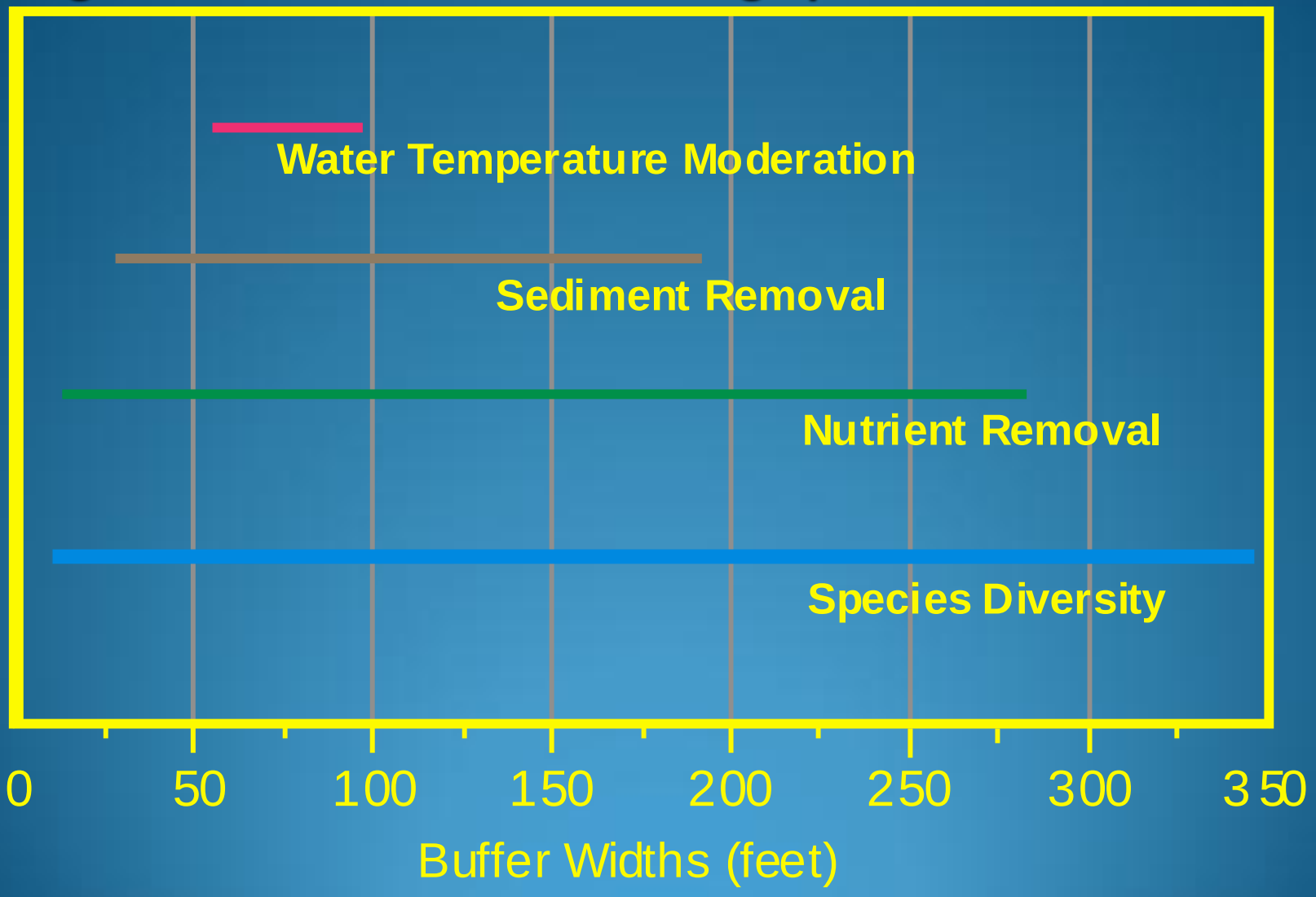
RIPARIAN BUFFER EFFECTIVENESS ANALYSIS



"...***riparian buffers are capable of reducing large percentages of the phosphorus and sediment that are currently being carried by Wisconsin streams. Even in watersheds with extremely high loads (top 10%), an average of about 70% of the sediment and phosphorus can be reduced through buffer implementation***." (*Diebel, M.J. and others, 2009, Landscape planning for agricultural nonpoint source pollution reduction III: Assessing Phosphorus and sediment reduction potential, Environmental Management, 43:69-83.*).

Effective implementation is based on sound science

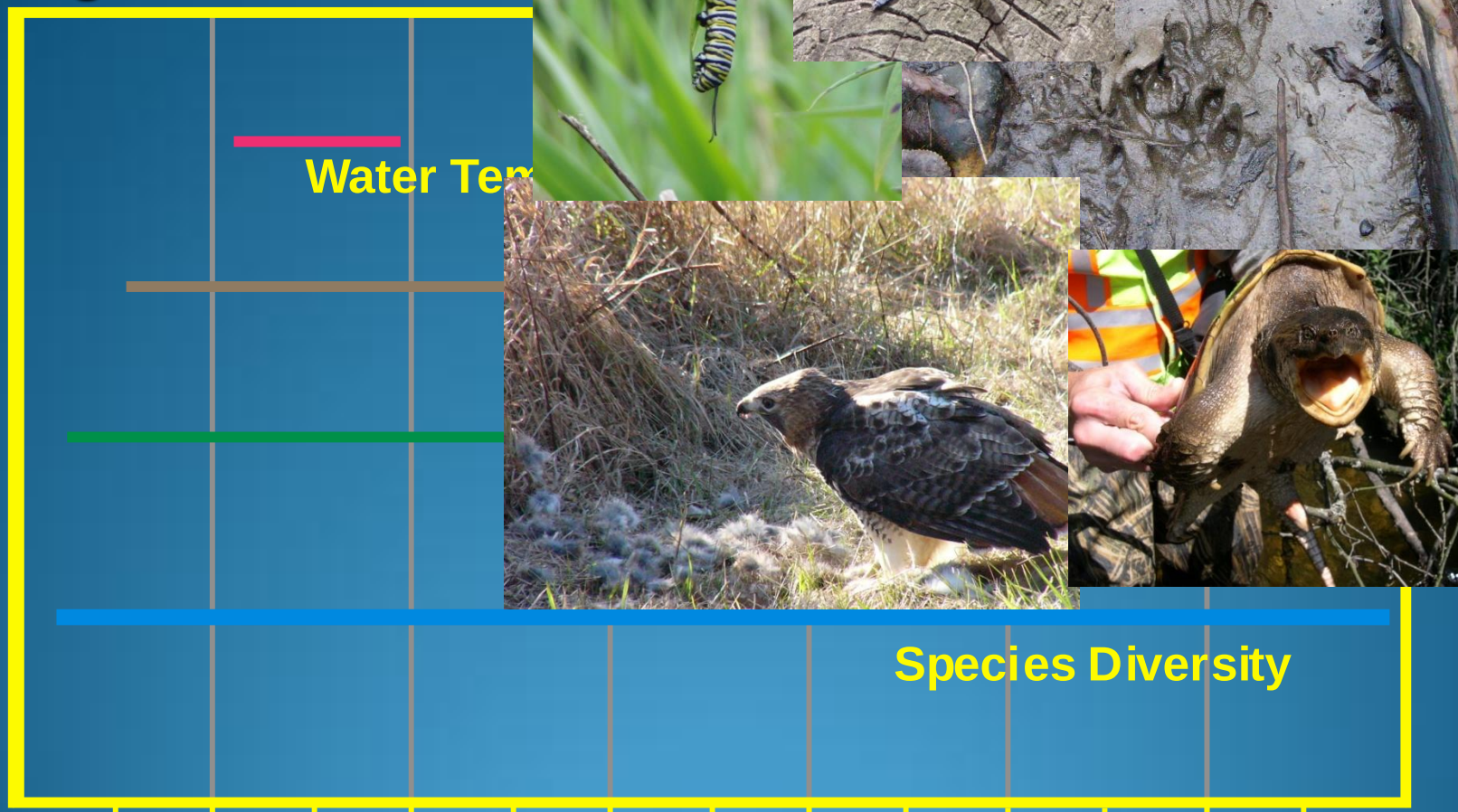
Range Of Buffer Widths Providing Specific Buffer Functions



Source: Castelle and others, 1994, Journal of Environmental Quality, Vol 23.

Effective implemen

Range Of Buffer Widt



Source: Castelle and others, 1994, Journal of Environmental Quality, Vol 23.

Effective implementation can be achieved through ordinance revision

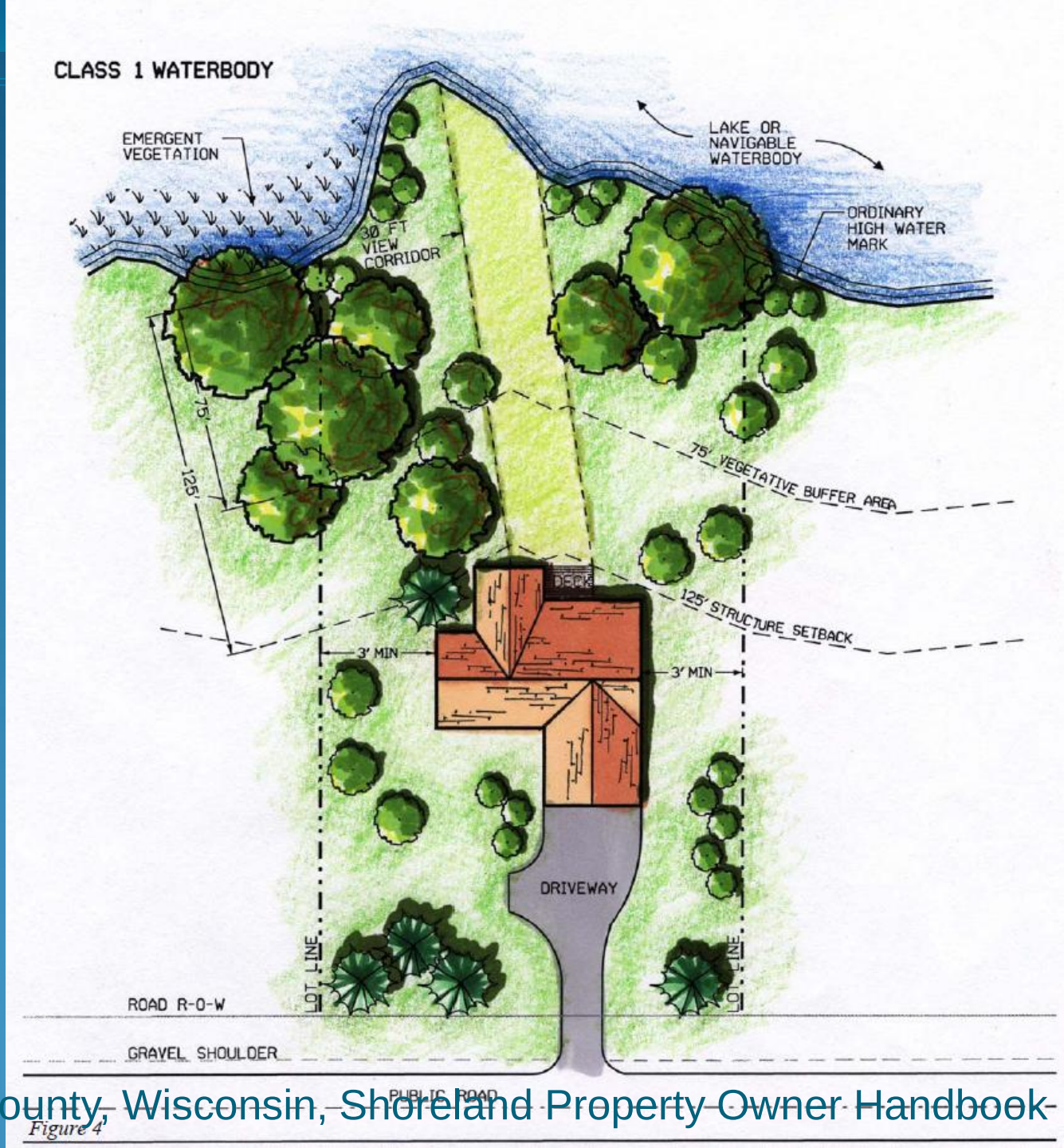
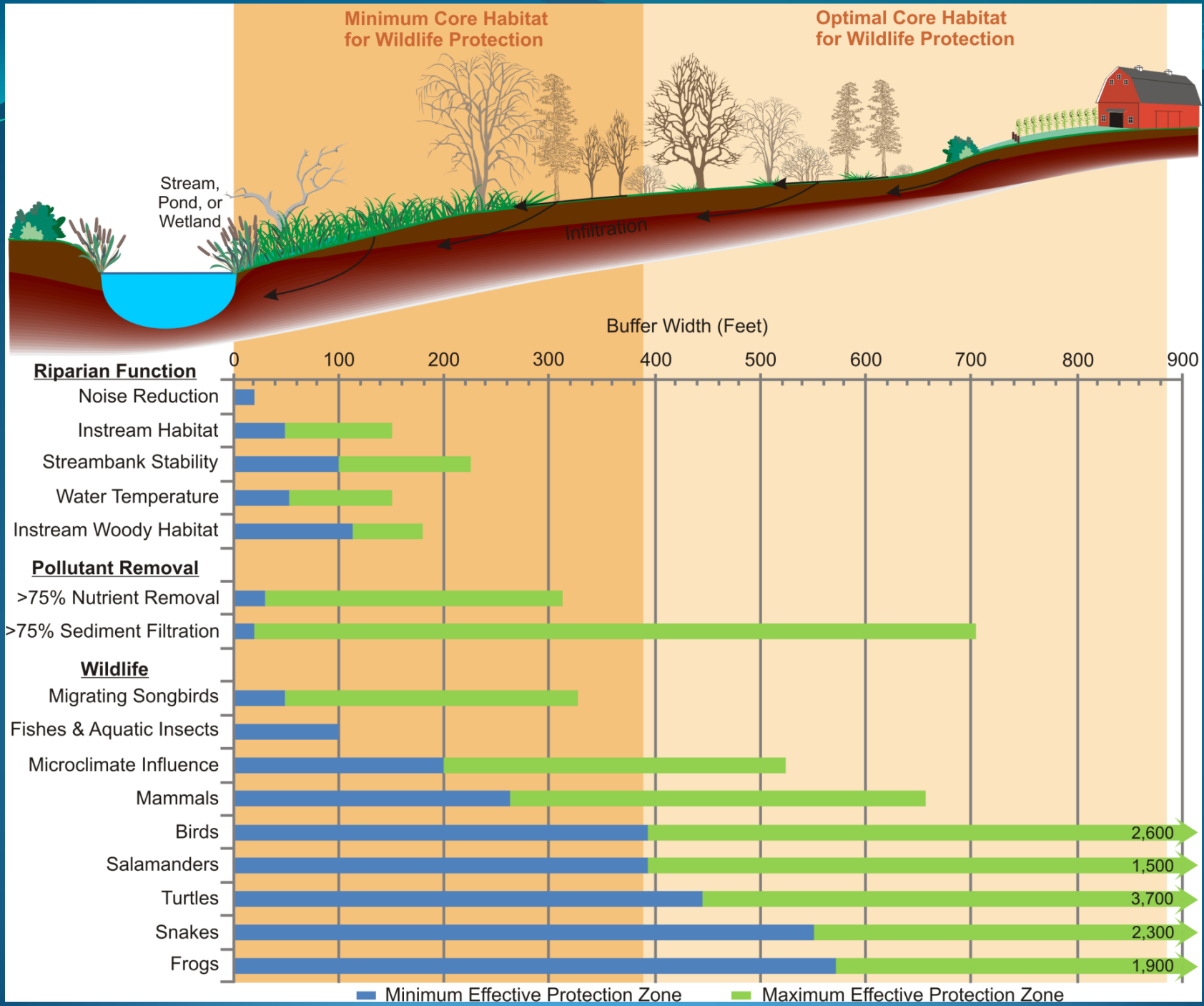
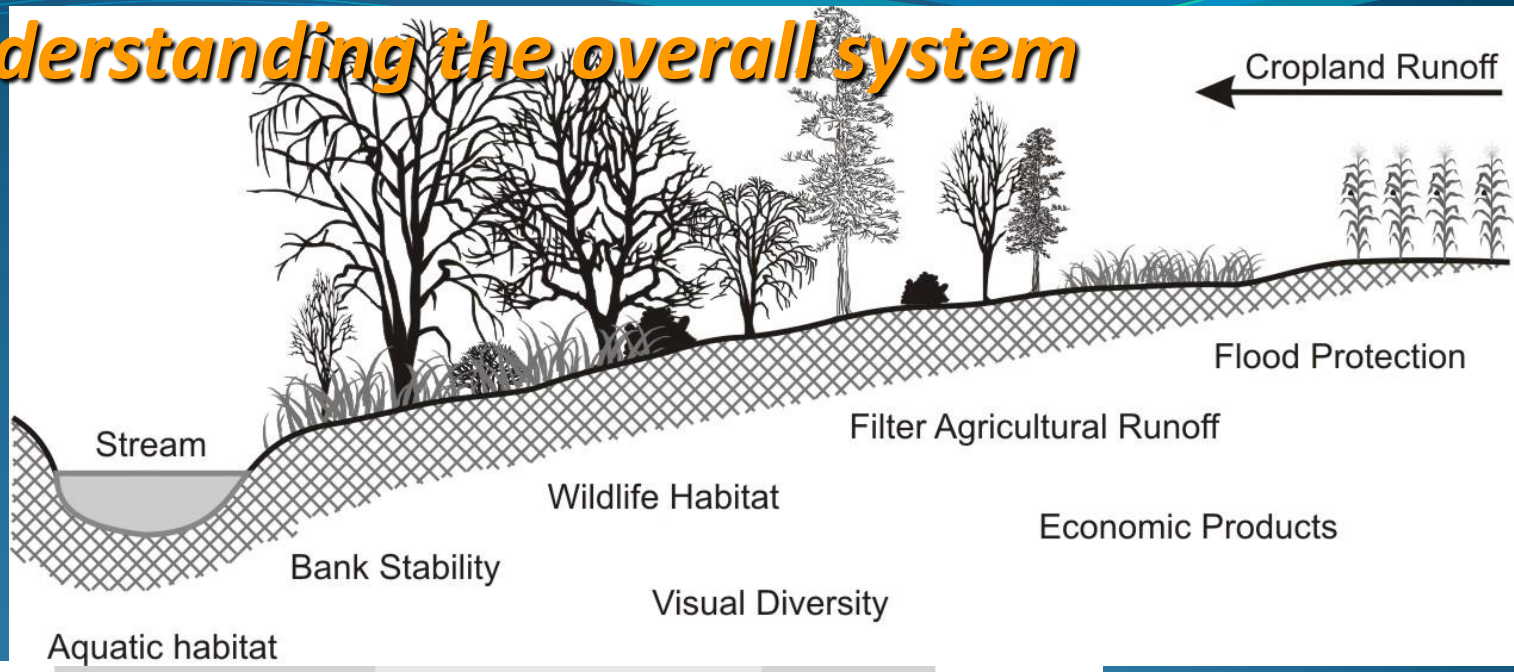


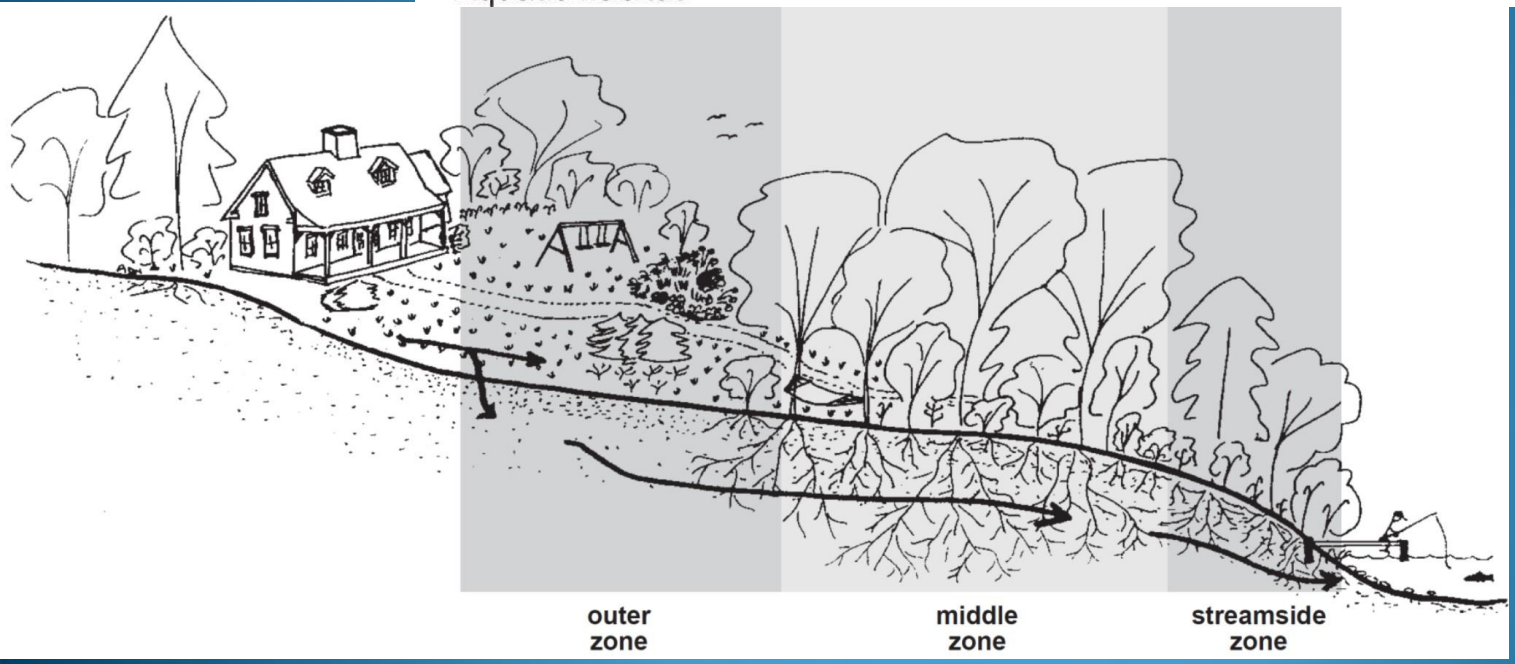
Figure 4

Source: Washington County, Wisconsin, Shoreland Property Owner Handbook

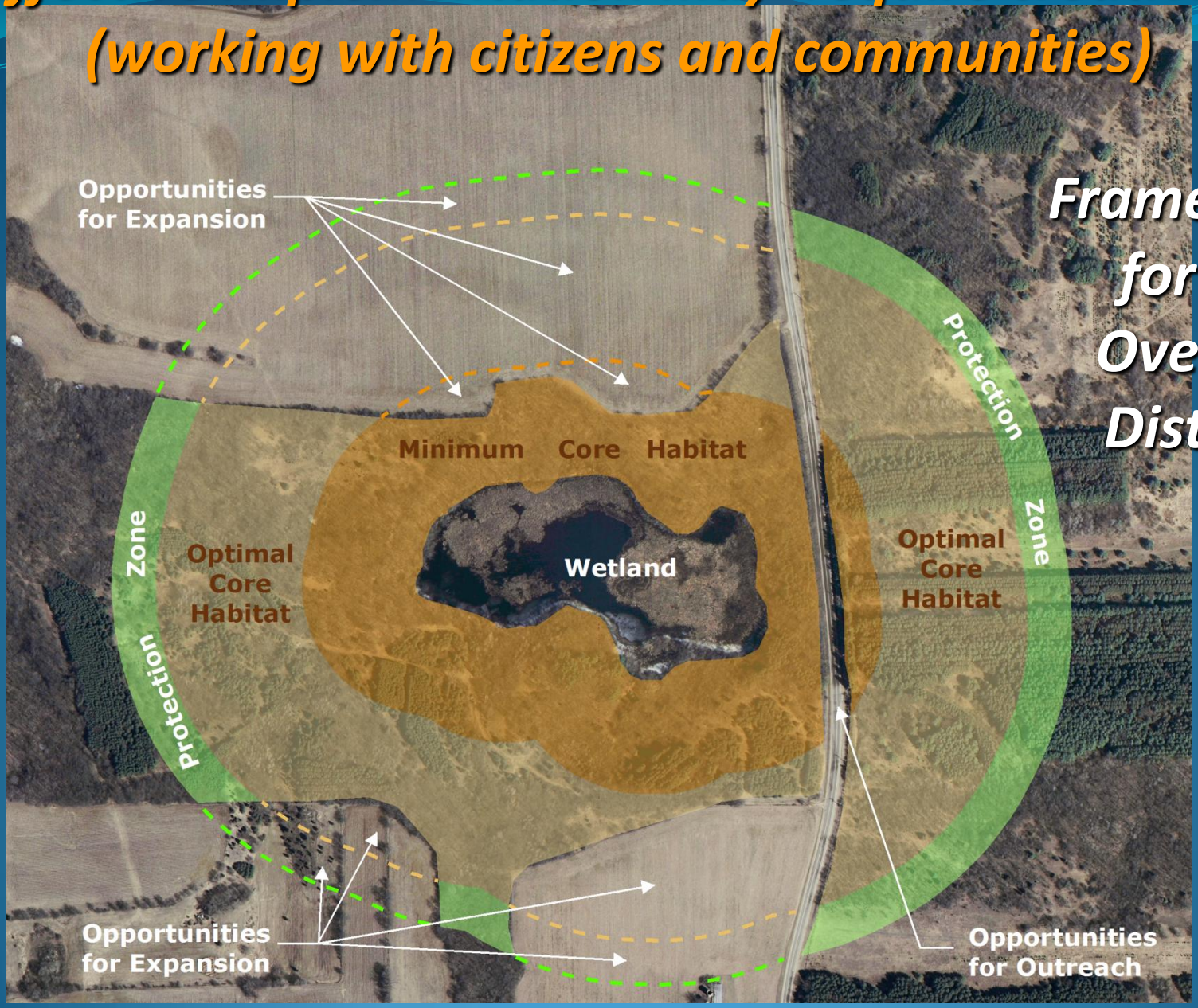

Minimum Core Habitat for Wildlife Protection
Optimal Core Habitat for Wildlife Protection
Stream, Pond, or Wetland
Infiltration
Buffer Width (Feet)
0
100
200
300
400
500
600
700
800
900
Riparian Function
Noise Reduction
Instream Habitat
Streambank Stability
Water Temperature
Instream Woody Habitat
Pollutant Removal
>75% Nutrient Removal
>75% Sediment Filtration
Wildlife
Migrating Songbirds
Fishes & Aquatic Insects
Microclimate Influence
Mammals
Birds
Salamanders
Turtles
Snakes
Frogs
2,600
1,500
3,700
2,300
1,900
Minimum Effective Protection Zone
Maximum Effective Protection Zone

Effective Implementation is based upon understanding the overall system



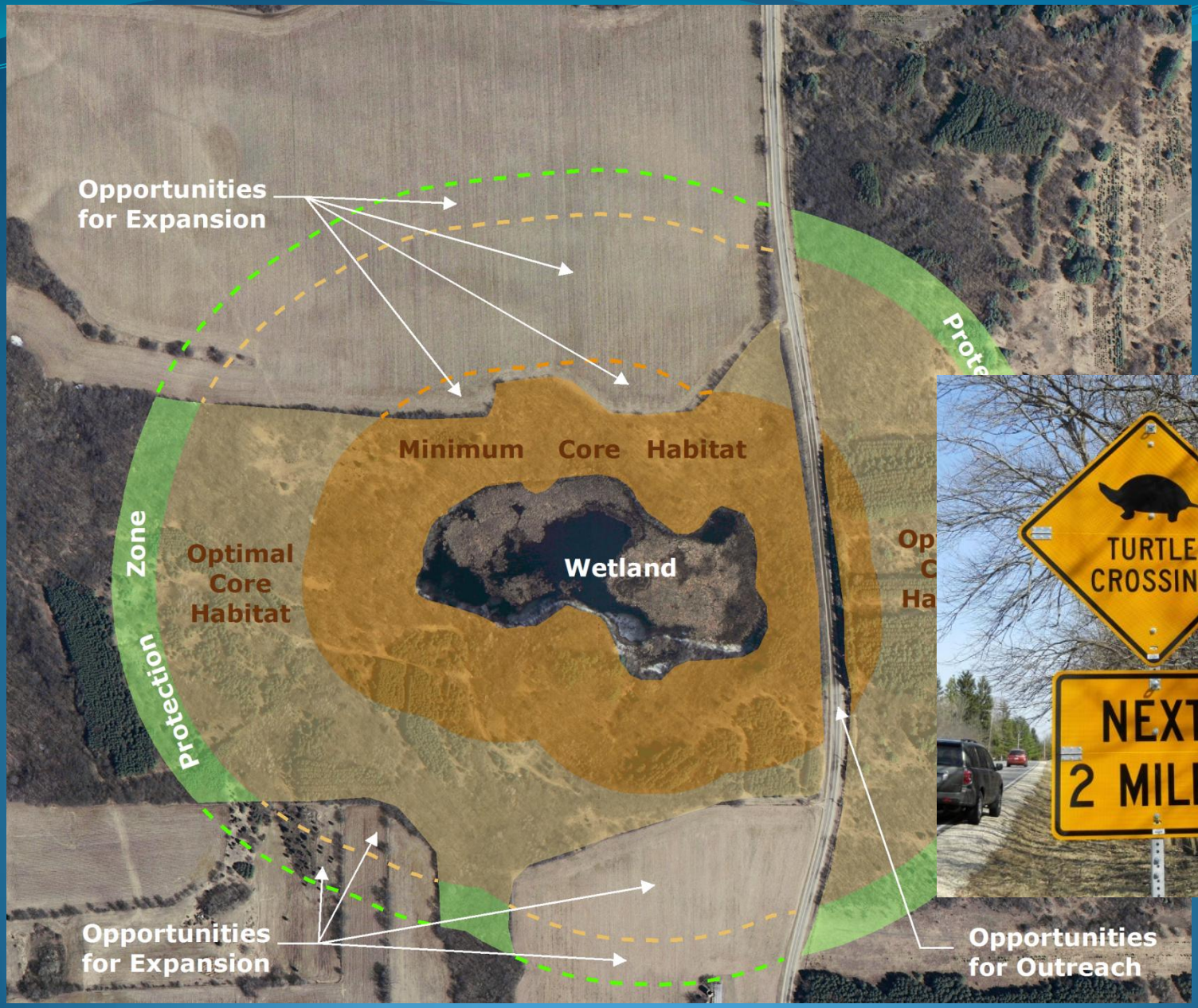


Effective Implementation may require creativity (working with citizens and communities)



Framework for an Overlay District

See http://www.sewrpc.org/SEWRPC/Environment.htm

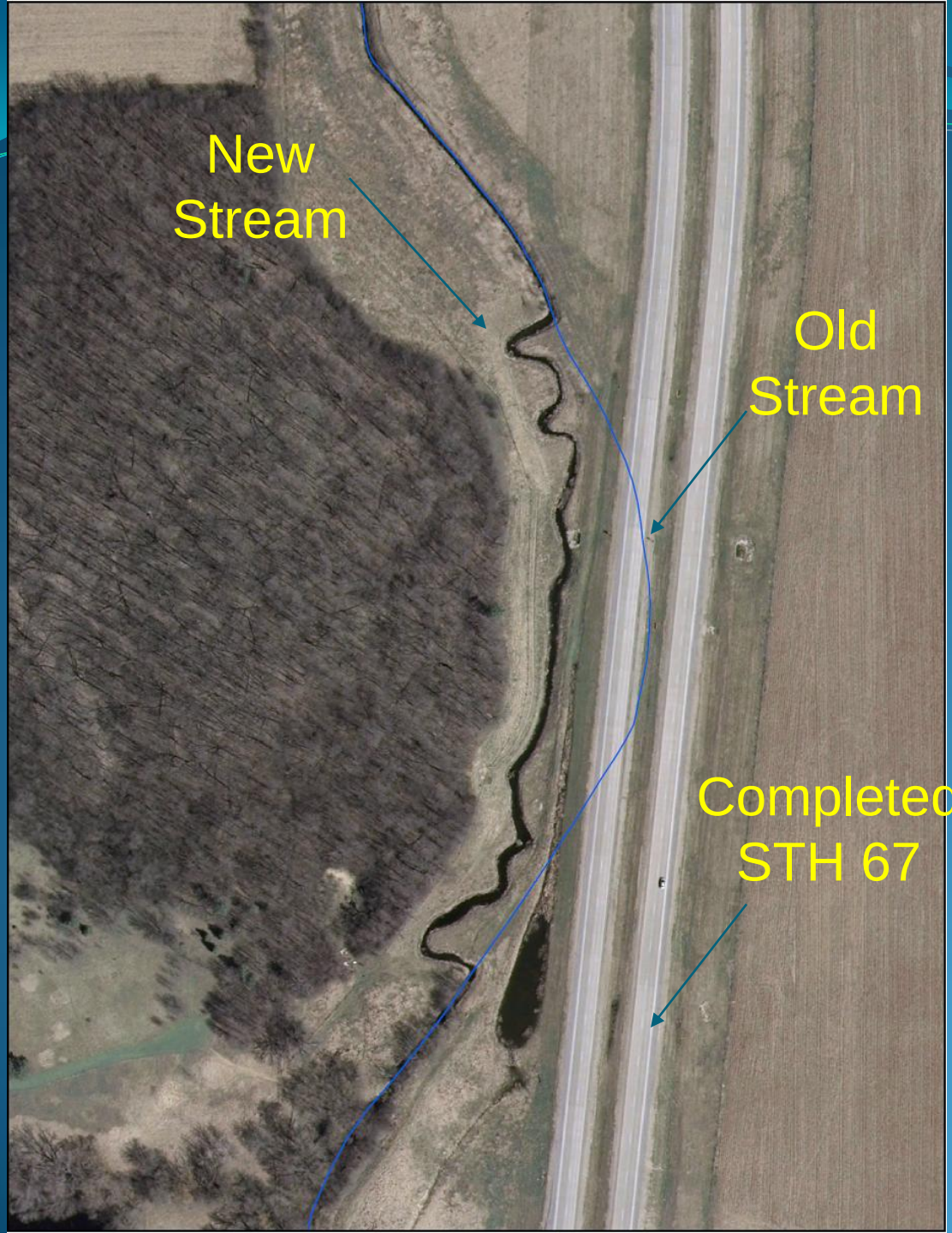


See http://www.sewrpc.org/SEWRPC/Environment.htm

Rosenow Creek Relocation/Restoration Project

WisDOT STH 67 Town of Oconomowoc Bypass,
Waukesha County, Wisconsin

Stream Design Elements

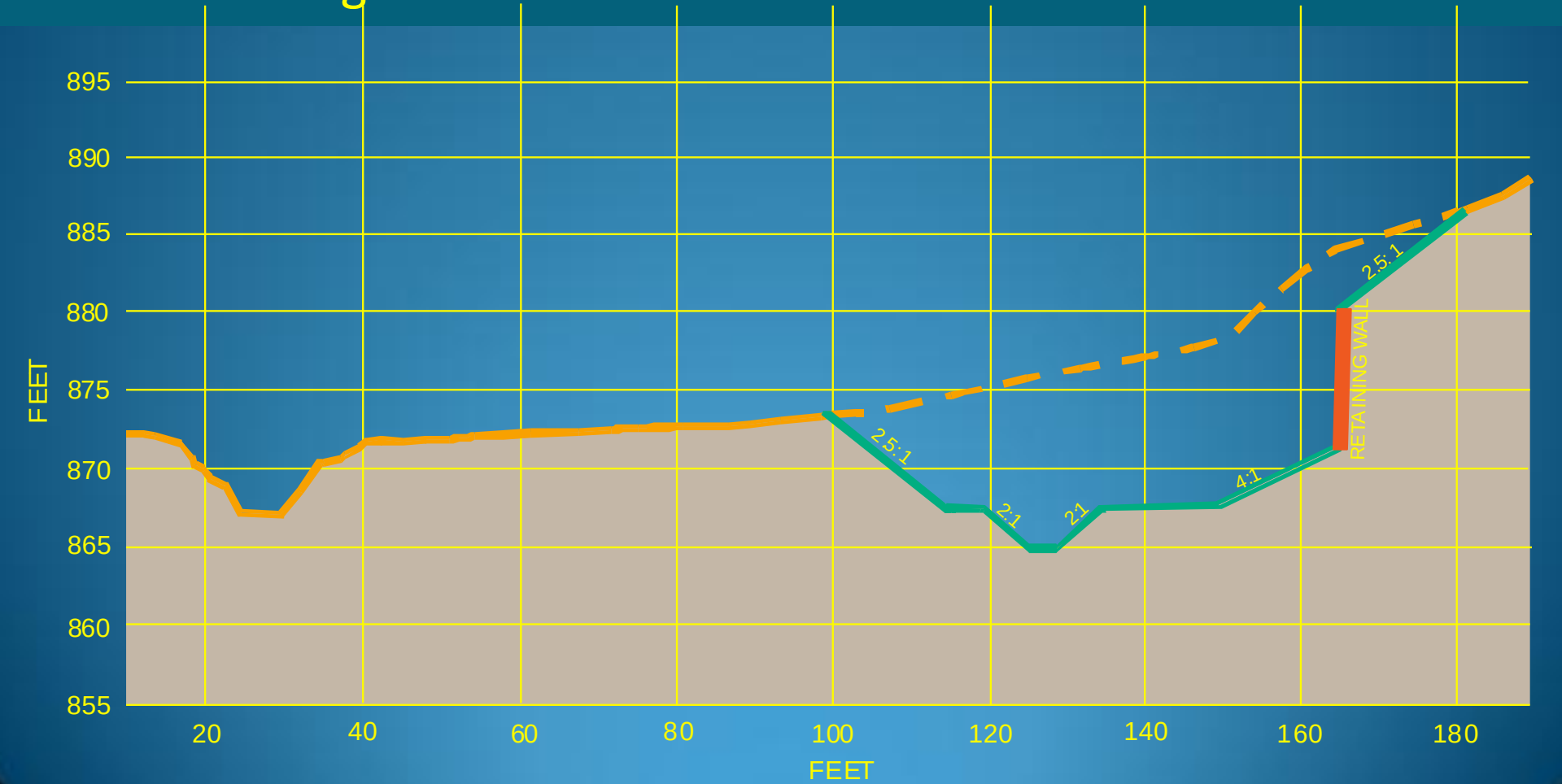


Stream Design Key Elements

Construction of retaining wall to allow creation of floodplain

Reconnection of stream with floodplain/wetland planting

Re-meandering stable stream reach



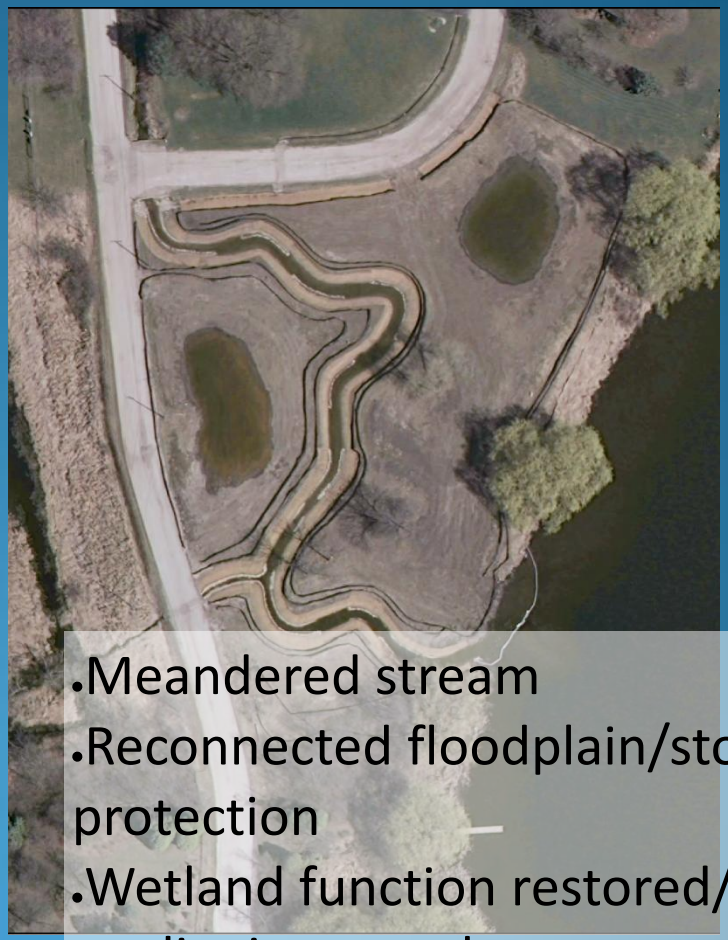
2004

2007

Conclusion: Successful restoration of the stream and its corridor within a confined roadway

There are opportunities to improve buffer functions for better water quality and wildlife habitat in many situations

- Channelized ditch
- Historic floodplain fill
- Invasive species dominate



- Meandered stream
- Reconnected floodplain/stormwater protection
- Wetland function restored/water quality improved
- Native species diversity restored

Agricultural to Urban Land Transitions

Effective Implementation is often based on timing

What about Ultra Urban Stream Corridors?

Photo Credit Alan Cressler, USGS

Effective Implementation is based on team approach

Case Study- WisDOT
Villa Mann Creek Project

Confined Stream Corridors may require buy outs for flood mitigation, to restore fisheries, and improve recreation/aesthetics

Photo Credit Alan Cressler, USGS

UNDERWOOD CREEK FLOOD MITIGATION AND STREAM RESTORATION PRE- AND POST-CONSTRUCTION

PRE-CONSTRUCTION SHOWING CONCRETE LINED STREAMBED AND STREAMBANKS

POST-CONSTRUCTION SHOWING RESTORED FLOODPLAIN CONNECTIVITY AND STREAM CHANNEL: 2009

Source: Thomas R. Sear, Short Elliott Hendrickson, Inc. (SEH) and SEWRPC.

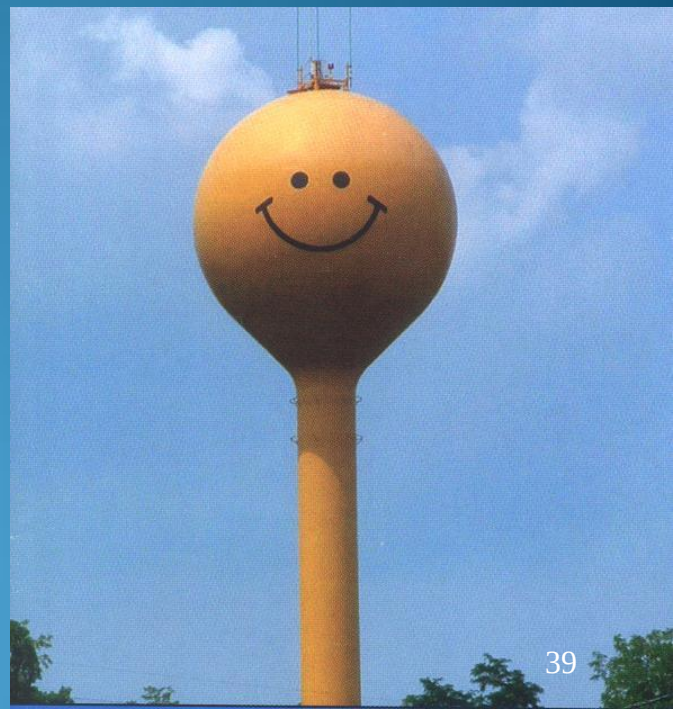
Source: SEWRPC MR 194.

The Human Dimension

How can we determine support for plans?

- What people say they want/don't want –
  Statements from or directly sampling them
- What their behavior says –
  May confirm or refute what they say
- Projections from broader or similar populations –
  Statistically reasonable comparisons
- What others say people want – Comments from possible representatives, with a "grain of salt"

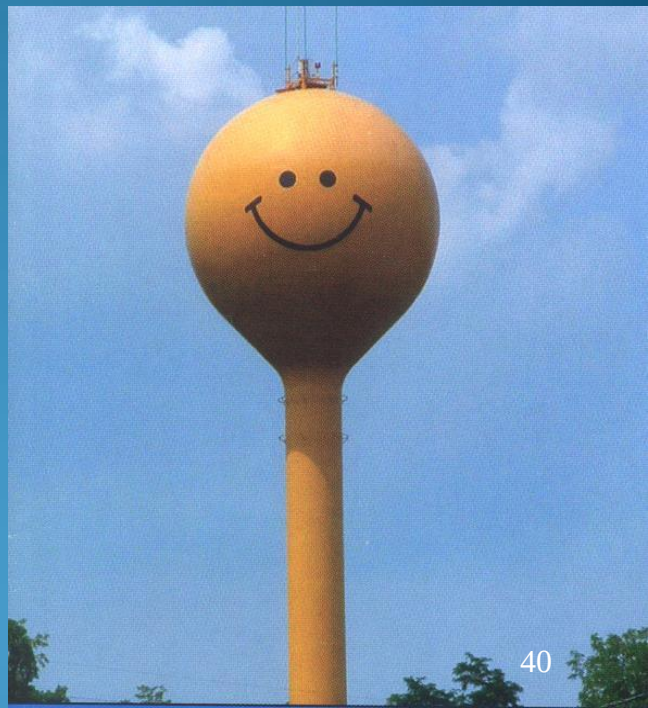
Virtually all indicators show broad support for SEWRPC's regional planning principles, nevertheless, implementation can be challenging.



The Human Dimension

Why does anyone do, or not do, anything?

- Firm belief that an action is right or wrong
- Image – wanting to appear good rather than bad
- Peer pressure/conformance – what others are doing, or not doing
- The law – avoiding violation or fear of getting caught
- Consequences if in the wrong
- Economics – dollars & cents
- Future value, whether economic or other
- Habit or stubbornness – proceed as usual or hold back without thinking objectively

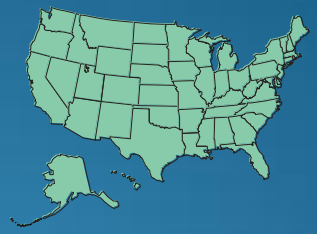


Political and Jurisdictional Hierarchy

Political

Jurisdiction

Federal



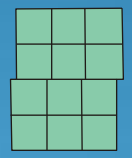
Clean Water Act

Public

State

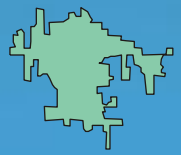
NR 102, NR 104

County



County Ordinances

Town, City, & Village



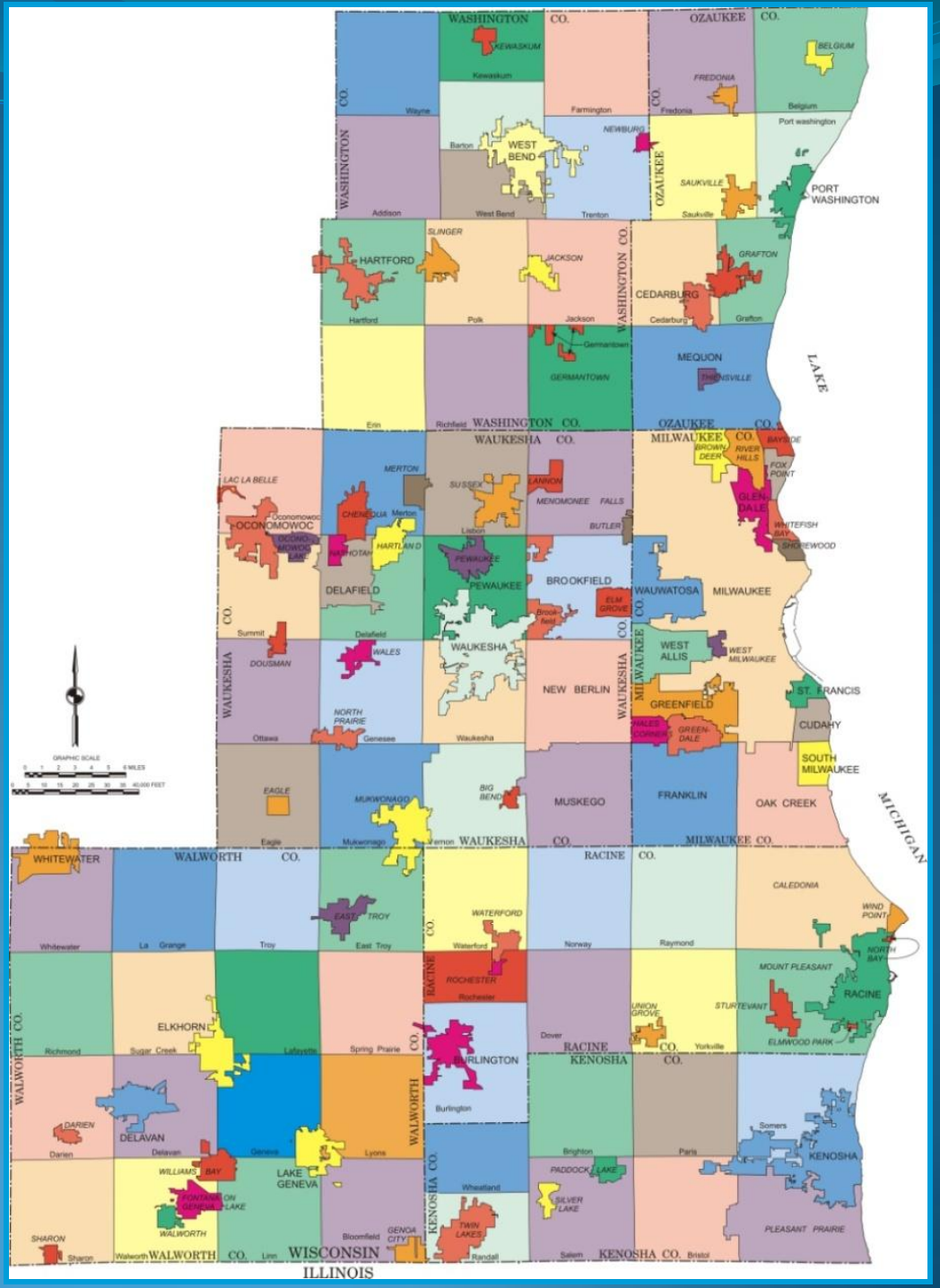
Local Ordinances

Waterbody

Why Plan?

Southeastern Wisconsin Region

- 153 general purpose units of government
  - 7 counties
  - 29 cities
  - 60 villages
  - 57 towns



Buffers provide frontline defense against climate change

"Riparian ecosystems are naturally resilient, *provide linear habitat connectivity, link aquatic and terrestrial ecosystems, and create thermal refugia for wildlife: all characteristics that can contribute to ecological adaptation to climate change."*

(N. E. Seavy and others, Why Climate Change Makes Riparian Restoration More Important Than Ever: Recommendations for Practice and Research, 2009, Ecological Restoration 27(3):330-338)

The Human Dimension in Planning

Why Plan?

- To correct the accumulated errors of the past
- To preserve and enhance what is good about the present
- To provide a smooth transition to the future
- To proceed toward what we value, while balancing many viewpoints and needs

Questions or Comments:
www.sewrpc.org
gkorb@sewrpc.org
262-547-6721